

## NoMoVo Cost Effectiveness Per EPA Cost Control Manual for Gas Absorbers

### CAPITAL COSTS

Purchased Equipment Costs	Cost (\$) <sup>1,2</sup>	Input Information / Notes
NoMoVo Unit(s)	\$246,400	Vendor quote 4 NoMoVo Scrubbers @ \$61,600 each
Instrumentation	\$0	Included in cost of NoMoVo unit
Slurry Storage Tank	\$40,000	Vendor quote
Sales Taxes	\$9,451	3.3% of purchased equipment cost
Freight	\$0	Included in cost of NoMoVo unit
<b>Total of Purchased Equipment Cost (PEC)</b>	<b>\$295,851</b>	Total of previous Purchased Equipment Costs inputs

Direct Installation Costs	Cost (\$) <sup>1,2,4</sup>	Input Information / Notes
Foundations and Support	\$0	not applicable
Handling and Erection	\$77,800	Vendor quote \$19,450 install cost per scrubber
Electrical	\$2,959	0.01 PEC
Piping	\$56,650	Site specific data per vendor quote
Insulation	\$0	Included in cost of NoMoVo unit
Painting	\$0	Not applicable
<b>Total of Direct Costs</b>	<b>\$137,409</b>	Total of previous Direct Installation Costs inputs

Other Direct Costs	Cost (\$) <sup>1,2</sup>	Input Information / Notes
Site Preparation	\$0	Not applicable
Buildings	\$0	Not applicable
<b>Total of Other Direct Costs</b>	<b>\$0</b>	Total of previous Other Direct Costs inputs

Indirect Costs (IC)	Cost (\$) <sup>1,2</sup>	Input Information / Notes
Engineering	\$45,458	Vendor quote 15% profit on NoMoVo units and piping
Construction and Field Expenses	\$0	Included in handling and erection
Contractor Fees	\$11,670	Vendor quote 15% profit on handling and erection
Start-Up	\$0	Included in handling and erection
Performance Test	\$0	Not applicable
Contingencies	\$8,876	0.03 PEC
<b>Total Indirect Costs</b>	<b>\$66,003</b>	Total of previous Total Indirect Costs inputs

<b>TOTAL CAPITAL INVESTMENT (TCI)</b>	<b>\$499,263</b>	Total of Purchased Equipment Costs, Direct Installation Costs, Other Direct Installation Costs, and Indirect Costs
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### ANNUAL COSTS

Direct Annual Costs	Cost (\$) <sup>1,2</sup>	Input Information / Notes
Operating Labor	\$3,564	Vendor quote site specific data (.33 hrs/day/unit * 90 days * 4 units * \$30/hr)
Operating Labor Supervisor	\$535	0.15 of Operator Labor based on EPA Cost Control Manual
Operating Materials: Solvents	\$0	Not applicable
Operating Materials: Chemicals	\$230	Makeup slurry (water) 80 gallons/day/unit * 90 days * 4 units * \$0.008/gallon
Wastewater Disposal	\$2,304	80 gallons/day/unit * 90 days * 4 units * \$0.08/gallon
Maintenance Labor	\$2,280	Vendor quote (1 hr/wk/unit * 13 wk/season * 4 units * \$30/hr + 6 hr/season/unit * 4 units * \$30/hr)
Maintenance Material	\$6,000	Vendor quote (\$1,500 parts/rebuild kit * 4 units)
Chiller (Glycol System)	\$1,722	Vendor quote (4000 Btu/hr/unit * 4 units * 24 hr/day * 90 days / 3412 Btu/hr/kW * \$0.17/kWhr)
Electricity	\$2,739	Vendor quote (2.5hp * .746kW/hp * 24 hr/day * 90 day/yr * 4 units * \$0.17/kWhr)
<b>Total Direct Annual Costs</b>	<b>\$19,374</b>	Total of previous Direct Annual Costs inputs

Indirect Annual Costs	Cost (\$) <sup>1,2</sup>	Input Information / Notes
Overhead	\$8,948	0.60 Labor and Maintenance Costs per EPA Control Cost Manual, Section 3, Chapter 2, Table 2.4
Administrative Charge	\$9,985	0.02 TCI based on Table 2.4 from EPA Cost Control Manual
Property Taxes	\$484	Site specific data (As assessed in 2017).
Insurance	\$749	Winery PP&E insurance averages 15 basis points per \$100 asset value
Annual Source Test(s)	\$0	Not applicable
<b>Total Indirect Annual Costs</b>	<b>\$20,166</b>	Total of previous Indirect Annual Costs inputs

Capitol Recovery	Inputs <sup>1,2</sup>	Input Information / Notes
Equipment Life (years)	15	Per EPA Cost Control Manual Section 5.2 Chapter 1 for Wet Scrubbers
Benchmark Interest Rate (%)	2.750	Department of the Treasury daily treasury yield curve rates for the specified equipment life <sup>6</sup>
Incremental Risk (%)	2.000	SBCAPCD P&P 6100.064, Section 7.1 <sup>7</sup>
Interest Rate- Rounded Up (%)	5.000	Calculated value per SBCAPCD P&P 6100.064, Section 7.1
Capital Recovery Factor	0.09634	Calculated value, see EPA Cost Control Manual for Annualized Cash Flow equation
<b>Annualized Capital Recovery</b>	<b>\$48,100</b>	<b>TCI * Capitol Recovery Factor</b>

### COST EFFECTIVENESS

Capitol Recovery	Inputs <sup>1,2</sup>	Input Information / Notes
Total Annual Cost	\$87,640	Calculated Value: Total Direct Annual Costs + Total Indirect Annual Costs + Annualized Capitol Recovery
Annual Tons Controlled	7.50	Annual Tons of ROC Controlled, see SBCAPCD Winery Calculation Spreadsheet <sup>8</sup>
<b>Cost Effectiveness (\$/ton)</b>	<b>\$11,691</b>	<b>Calculated Value: Total Annual Cost / Tons Controlled</b>

**Notes:**

1. Red values denotes user inputs.
2. Use site specific data where able.
3. Percentages found in the "Purchased Equipment Costs", "Direct Installation Costs", "Other District Costs", and "Indirect Costs" are from Table 2.3 in the EPA Cost Control Manual (Link: <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution#costmanual>).
4. If able, do not include "Direct Installation Costs" as part of the "NoMoVo Unit(s)" PEC cost.
5. Percentages found in the "Direct Annual Costs" and "Indirect Annual Costs" are from Table 2.4 in the EPA Cost Control Manual (Link: <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution#costmanual>).
6. Daily Yield Curve Rates from the U.S. Department of the Treasury can be found online at: <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield>.
7. SBCAPCD Best Available Policy and Procedure 6100.064 can be found online at: <https://www.ourair.org/wp-content/uploads/6100-071-1.pdf>.
8. SBCAPCD Winery Calculation Spreadsheet can be found online at: <https://www.ourair.org/wineries/>.

**Annual Wine Fermentation Emission Calculations**

**Annual Wine Inputs**

<u>Information</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>
Wine Tank Capacity.....	563,930	gallon	Permit Application
Percent Red Wine Usage.....	100	%	Reasonable Worst-Case
Red Wine Tank % Fill.....	80	%	SBCAPCD Default
White Wine Tank % Fill.....	90	%	SBCAPCD Default
Annual Red Wine Tank Turns.....	8	turns/yr	Reasonable Worst-Case
Annual White Wine Tank Turns.....	4	turns/yr	Reasonable Worst-Case
Emission Capture & Control Efficiency.....	67	%	Permit Application

**Emission Factors**

<u>Emission Source</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>
Red Wine Fermentation	6.20	lb/1000 gal	CARB March 2005
White Wine Fermentation	2.50	lb/1000 gal	CARB March 2005

**Wine Production**

<u>Information</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>	<u>Reference</u>
Red Wine Fermentation Capacity.....	451,144	gallon	Calculated	
White Wine Fermentation Capacity.....	0	gallon	Calculated	
Annual Red Wine Fermentation.....	3,609,152	gal/yr	Calculated	
Annual White Wine Fermentation.....	0	gal/yr	Calculated	

**Wine Fermentation ROC Potential to Emit**

	<b>TPY</b>
Red Wine Fermentation Emissions	11.19
White Wine Fermentation Emissions	0.00
Total Emissions	11.19
<b>Controlled Emissions</b>	<b>7.50</b>